Case Study: Jin Mao Tower Reduces Energy Use by 20% Through Low-Cost and No-Cost Operational and Retrofit Measures

Project Summary

The Jin Mao Tower is a 290,000 square meter mixed use building (office, hotel and retail) located in the Pudong area of Shanghai, managed by JM Imtech Facility Services (www.jmimtech.com). It is one of the tallest building in China and the fourth tallest building in the world. The Tower was the first building in China to use the U.S. Environmental Protection Agency's Benchmarking Tool* in association with the eeBuildings** program (www.epa.gov/eeBuildings). Through low-cost and no-cost operational and retrofit measures, the building has reduced its energy consumption by 20% since 2001.

Actions Taken

In 2001, after participating in an eeBuildings training, JM Imtech Facility Services benchmarked the energy performance of the Jin Mao Tower using the U.S. EPA Benchmarking Tool. Later, JM Imtech was able to measure improvements in building energy performance, as they implemented strategies to reduce building energy consumption, by comparing subsequent benchmark scores to the initial benchmark score set in 2001. JM Imtech made these improvements:

- **Doors:** Replaced sliding doors with revolving doors, resulting in reduced infiltration in winter and reduced cooling energy loss in summer.
- **Variable Pumping:** Installed variable frequency drives in all tenant cooling systems.
- **Optimization of Chilled & Condenser Water:** Optimized the chilled water leaving and condenser water entering temperatures based on outside air conditions and building load profile.
- **Variable Kitchen Exhaust:** Reduced airflow and fan energy use during idle, non-cooking periods by means of temperature and optic sensors mounted inside the hood to detect heat and smoke load.
- **Building Pressure Balance:** Made continuous efforts to optimize the pressure balance in the building in order to avoid infiltration and loss of conditioned air.

Results

From 2001 to 2003, through these low-cost and no-cost operational and retrofit measures, the Jin Mao Tower reduced its energy consumption by 20% and increased its U.S. EPA Benchmarking score by 10 points. Furthermore, In an energy survey conducted in October 2003 by Servidyne Systems, LLC, a long-time Partner of the

U.S. EPA's domestic energy-efficient commercial buildings program, ENERGY STAR, Jin Mao Tower's office demonstrated that it used approximately 30% less energy than buildings in comparable climate zones. In addition, the hotel is operating at the low end of the range for comparable hotels throughout the world.

Next Steps

From October 2003 to February 2004, Servidyne Systems, LLC performed an independent energy survey of the building. The objective of the study was to identify additional energy saving opportunities that could further improve the energy performance of the building. Based on these results, the Jin Mao Tower is evaluating additional low-cost and no-cost operational and retrofit measures to further improve the energy performance of the building.

Contact Information

To find out more about the JM Imtech go to (www.jmimtech.com) or contact Mr. John Bauer at JBauer@jmimtech.com, (86-21) 5047-2955. For more information on the eeBuildings program, to find out about upcoming trainings and events, or for general information on how to reduce building energy consumption using simple, low-cost operational measures, go to www.epa.gov/eeBuildings or write to eeBuildings@epa.gov.

*The U.S. EPA Benchmarking tool (www.epa.gov/eeBuildings/Benchmarking) is an on-line tool that allows building owners and managers to compare their buildings' energy consumption to other similar buildings worldwide. The tool rates building energy performance on a 1 to 100 scale, where 50 is considered is average energy performance. The tool accounts for differences in building size, occupancy, operating hours, plug loads, climate, and weather and is intended for use with Class A buildings maintaining international comfort standards.

** The U.S. Environmental Protection Agency's eeBuildings (energy-efficient Buildings) www.epa.gov/eeBuildings program helps building owners, managers, and tenants improve the energy performance of their buildings. Drawing on the expertise of ENERGY STAR, eeBuildings connects financial and environmental performance to energy efficiency.